U. S. DEPARTMENT OF COMMERCE

Technical News Bulletin

of the

National Bureau of Standards

★ *Issued Monthly* ★

Washington | February 1940[1] | Number 274

CONTENTS

Evaluation of fire-resistance requirements.
Vibrators for fabricating test mortars.
Structural properties of "Insulite" wall and partition constructions.
Commercial standard for hardwood interior trim and molding.
Stability of sheathing papers.
Conditioning paper for multicolor offset printing.
Inspections of coatings on underground pipe lines.
United States standard gage for sheet and plate iron and steel.
Fuel requirements of 1939 automobiles.
Effect of automobile mileage on octane number requirement.
Theory of the potential and the technical practice of electrodeposition.
Stability of base-metal thermocouples.
First spectrum of tin.
Radio critical frequencies and solar eclipses.
Safety rules for radio installations.
Alpha and beta methyl lyxosides.
Reaction of bromine with furfural and related compounds.
Structure of difructose anhydride III.
New and revised publications issued during January 1940.
Mimeographed material: Letter Circulars.
Recent Bureau articles appearing in outside publications.

EVALUATION OF FIRE-RESISTANCE REQUIREMENTS

The usual method of specifying structural fire protection has been in terms of thickness, or type and thickness, of materials. In recent years some public requirements, such as building codes, have defined the degree of fire resistance in terms of performance in recognized furnace tests. Even so, in their application there has been little differentiation between buildings or occupancies in buildings involving high and low amounts of combustible materials.

In the period 1922 to 1926 a series of tests was conducted at the Bureau to obtain information on the intensity and duration of fires in buildings in their relation to the amount and calorific values of their combustible contents, as expressed in weight or heat units per unit of floor area or room volume, assumed uniformly distributed. The tests, which were mainly representative of office and record storage occupancies containing wood and metal furniture and paper records, were conducted in one-story fire-resistive buildings of floor area up to 30 by 60 feet and concentrations of combustible contents from 13 to 55 lb./ft.^{2}, taken as uniformly distributed. These indicated fire severities equivalent to from 1 hour to nearly 8 hours of fire exposure in the furnace test applied to determine the fire resistance of building constructions. In a later test with kerosene having a calorific value per pound of over twice that of wood and paper, a little lower fire severity was indicated than with an amount of wood and paper having equivalent fuel value.

To aid in applying fire-resistance requirements, a survey was made of combustible contents of a number of public and private fire-resistive office buildings in Washington. These indicated a range from less than 5 up to 80 lb/ft^2, assumed uniformly distributed, the lighter contents applying to executive offices and reception rooms and the heaviest to conjested filing rooms equipped with wood filing cases stacked in heights of 8 to 10 feet. Any combustible material in finish floor and trim was included.

Following the standardization of fire-testing procedure, beginning under the auspices of the American Society for Testing Materials in 1917, the results of fire tests conducted under controlled conditions indicated a large range in fire resistance of nearly comparable constructions and protections, resulting

[1] Published with the approval of the Director of the Budget.

from variations in details of application, mineral composition of aggregates for concrete, and type of clay and hardness of burning for burnt clay products. Thus, steel columns protected with a 2-inch thickness of portland cement concrete supported a design load in the furnace test from less than 2 to over 7 hours, and 8-inch clay hollow-tile walls from less than 2 to over 3 hours as tested bare, and from less than 3 to over 4 hours with plaster on both sides. In view of this, in an attempt to make them more definite, the practice began of placing fire-resistance requirements on the basis of performance in fire tests. The maximum requirements for buildings of the highest fire-resistance or fireproof type were placed in the range 2½ to 4 hours, generally without any allowance for different occupancies or combustible contents of the buildings.

In connection with the Government's low-cost housing activities, these building-code and fire-insurance requirements, while hardly obtaining the protection needed where large amounts of combustible contents are present were found to be unduly restrictive as applied to residential occupancies. Where the kind and thickness of materials were specified, a fire resistance of over 8 hours might be required for a hazard that would not correspond to more than the first hour of fire exposure in the standard furnace test. The Bureau was requested to cooperate in the development of reasonable recommended requirements, and in November 1938 a group was organized for this purpose, under the auspices of the Central Housing Committee, with representatives from the Home Owners' Loan Corporation, the Federal Housing Administration, the Public Buildings Administration, the Public Works Administration, the U. S. Housing Authority, and the National Bureau of Standards. Its work has comprised classification and definition of building types from the standpoint of fire resistance, and surveys of combustible contents associated with representative occupancies or buildings. Surveys of school buildings, office buildings, dwellings, and apartments are completed or nearly completed, and surveys of warehouses and other commercial buildings are in progress. Work has also begun on compiling fire-resistance classifications of building constructions and materials as based on published results of fire tests and on acceptance tests or recent research, the results of which have not as yet been published.

During the past few months, the Bureau has conducted further fire-severity tests under conditions more nearly representative of residential occupancies than those previously mentioned. A one-story building was outfitted as a living-room, dining-room, kitchen suite, with furniture and other contents in the range 5½ to 8½ lb/ft² of floor area. Fires completely consuming these contents were indicated as equivalent in severity to from 30 to 45 minutes of the furnace test. In one test, representative of the maximum concentration of combustibles from furniture storage found in residential apartment buildings, the severity of the fire was indicated to be a little less than that for the first hour of the furnace test, the weight of combustible contents being equivalent to 12 lb/ft² over the whole floor area. This is in line with the results obtained in the previous fire-severity tests with office occupancy.

VIBRATORS FOR FABRICATING TEST MORTARS

Vibration is being increasingly used for compacting concrete into the form, particularly in large building operations. The application of this method to mortar test specimens seemed desirable because it would eliminate part of the human element in the test procedure. Accordingly, studies were made of the vibration of mortars into standard test specimens (2-inch cubes), using various vibrational intensities. Two vibrators were used, one a commercial magnetic barrel-packer vibrator, having a fixed frequency of twice the frequency of the supply current, the other a mechanical vibrator designed at the Bureau, which produced horizontal rotary motion.

As explained in a paper (RP1273) by R. L. Blaine and John Tucker, Jr., in the February Journal of Research, it was found that better results could be obtained with the rotary vibrator operating at 83 cycles per second, than with the magnetic vibrator.

Standard Ottawa sand mortars were at least as satisfactory for compaction by vibration as any of the other mortars tested. The mortars had to be very dry.

The reproducibility of batches was found best in 1:3½ and 1:4 standard Ottawa sand mortars with water contents of 9.5 and 10 percent, respectively. The 7-day strength of these mortars was approximately 3,000 lb/in², which was the same as the strength of plastic sand hand-compacted mortar prepared according to Federal Specification SS–C–158, and also approximately the same as that of a 1:2.2:3.8 concrete with a slump of approximately 1¾ inches (C/W=1.7).

The vibration of the mortar into the standard test specimens gave more reproducible results than were obtained from hand-compacted specimens.

STRUCTURAL PROPERTIES OF "INSULITE" WALL AND PARTITION CONSTRUCTIONS

Building Materials and Structures Report BMS31, which has just been released, describes tests on 114 specimens of wall and partition constructions submitted by the Insulite Co. The specimens represented wood-frame wall and partition constructions with "Bildrite" sheathing, "Graylite" interior board, and "Lok-Joint" lath.

The wall specimens were subjected to compressive, transverse, concentrated, impact, and racking loads; and the partition specimens to impact and concentrated loads. The transverse, concentrated, and impact loads were applied to both faces of the wall specimens. These loads simulate those actually applied to the elements of a house.

For each of the loads, three like specimens were tested. The deformation under load and the set after the load was removed were measured for uniform increments of load, except for concentrated loads, for which the set only was determined. The results are presented in graphs and in a table.

Copies of BMS31 are obtainable from the Superintendent of Documents, Government Printing Office, Washington, D. C., at 15 cents each.

COMMERCIAL STANDARD FOR HARDWOOD INTERIOR TRIM AND MOLDING

Reasonable quality requirements for hardwood interior trim and molding, which have been agreed upon by manufacturers, distributors, and users, are set forth in Commercial Standard CS76–39, released last month.

The standard provides minimum requirements for two grades of hardwood interior trim and molding: (1) "grade A," which is suitable for natural finish and highest quality paint finish, and (2) "grade B," which is normally confined to a paint finish. The characteristics and seasoning defects that are permissible in each grade are enumerated under detail requirements and further described in a section composed of nomenclature and definitions.

Copies of CS76–39 are obtainable from the Superintendent of Documents, Government Printing Office, Washington, D. C., at 5 cents each.

STABILITY OF SHEATHING PAPERS

The importance of a lasting barrier to the passage of air and moisture through the walls of houses is emphasized in Building Materials and Structures Report BMS35, which deals with the aging properties of sheathing papers.

Sheathing paper constitutes only a very minor part of the cost of a new house, but it performs a very important function. It is used as a seal against the infiltration of cold air and water from the outside, and the loss of moisture vapor and warm air through walls and ceilings from within. The function of preventing the passage of vapor from within is becoming increasingly important with the use of air conditioning, because vapor that permeates through walls or ceilings may condense within the walls during cold weather to cause serious damage. Papers that perform these functions satisfactorily while new are readily available, but not all of them appear stable enough to offer lasting protection.

In an investigation of the stability of sheathing papers, recently conducted at the Bureau, accelerated-aging tests were employed. These produced, in a relatively short time, effects similar to those likely to arise from long periods of natural aging. The sheathing papers were put through cycles in which they were soaked in water, frozen at 11° F, and dried in an oven at 150° F. The effects of this drastic treatment were determined by measuring the important properties of the papers before and after exposure. Some papers lost their resistance to water and water vapor rapidly, whereas others withstood the treatment for 600 hours without significant change. Some papers shrank so much on wetting and drying that they tore away from the nails at the joints. It is gratifying to know that papers having satisfactory properties originally and which are little affected by the accelerated aging are available.

Copies of BMS35 are now obtainable from the Superintendent of Documents, Government Printing Office, Washington, D. C. The price is 10 cents.

CONDITIONING PAPER FOR MULTICOLOR OFFSET PRINTING

Offset lithographers have been given further assistance as a result of the Bureau's study of their paper requirements. Good register in multicolor printing requires special adjustment of the moisture content of the paper so as

to minimize change in dimensions. Previous studies have established the moisture condition necessary for best results in printing, and now an improved method for obtaining this condition has been developed.

In conventional conditioning of offset papers, the room atmosphere is blown up around the paper, which is hung in lifts of approximately 35 sheets each. The new method employs humidifier spray nozzles, and water as a finely divided spray is added to the air entering the conditioning machine. Paper is properly stabilized for color printing, with respect to dimensional changes, when its moisture content is approximately 0.5 percent above equilibrium with the humidity of the atmosphere in which it is to be printed. It can be so stabilized by conditioning to equilibrium with relative humidity 5 to 8 percent above that in the pressroom, and this requires either the facilities of a room separate from the pressroom and under independent control, or the operation of a fully enclosed conditioning machine in the pressroom. In the latter case, the controlled addition of water is essential to success, and in the former, it increases greatly the rate of conditioning and the efficiency of the machine. The new method of conditioning has been given a thorough trial in a commercial offset-printing plant. It doubled the capacity of the conditioning machine by reducing the time required, and adjusted the moisture content more accurately than previous methods.

INSPECTIONS OF COATINGS ON UNDERGROUND PIPE LINES

The final inspections of the pipe-line coatings installed in 1930 in the tests undertaken jointly by coating manufacturers, the American Petroleum Institute, and the Bureau will be made during the coming spring and summer. The work will be under the supervision of K. H. Logan, who will prepare the report, submit it to the cooperating coating manufacturers for criticism, and present it at the annual meeting of the Institute in 1940. A more complete and final report may be prepared later.

The following tests will be made: (1) soil-resistivity measurements; (2) current on the working lines; (3) pattern tests for the location of pinholes; (4) coating resistance (electrical); (5) inspection of coatings, probably in accordance with the Underground Pipe Protection Institute's code for inspections; (6) measurements of pit depths on bare and coated specimens of pipe. Photographs of each coating will probably be taken, but only a few of them will be published.

At each of 13 test sites there remain 14 coatings on each of two 12-foot sections of working pipe line. At 15 test sites there are approximately 46 varieties of coatings applied to 2-foot sections of 3-inch pipe. There are also several sections of uncoated line and 3-inch pipe at each test site.

The exposure of this large number of protective coatings applied to working pipelines, subjected to a variety of soil conditions for 10 years, offers an unusual opportunity for the collection of information about the serviceability of protective coatings. At a recent meeting of the Topical Committee on Pipe Line Technology of the American Petroleum Institute it was decided to permit anyone who so desires to be present at the time the coatings are exposed and to make such observations as he wishes, under three conditions: (1) that private observers will not delay the work or injure the coatings; (2) that the data obtained will be used only for scientific purposes; and (3) that the results of private inspections will not be published prior to the publication of the final report by the American Petroleum Institute.

Two organizations have already stated that they wish to have representatives accompany the Bureau's men from the beginning to the end of the inspection trip. These inspectors should be able to collect much more reliable and complete data than would be possible if different inspectors were sent to each site, and they will no doubt return with much information that could not be obtained through reading the published report.

The following is a tentative schedule for the inspections. Because of weather and labor conditions it may not be practicable to adhere strictly to the schedule, and it is impracticable to determine far in advance the exact day on which any particular coating will be exposed.

Anyone who desires to have a representative at any or all of the test sites should send in his name and address to K. H. Logan, National Bureau of Standards, Washington, D. C., with a statement of the test sites he wishes to visit and the coatings in which he is especially interested.

Tentative schedule for inspections of pipe coatings

Site near	Inspection period
Long Beach, Calif.	March 4 to 12
Cholame Flats, Calif.[1]	March 14 to 20
Mendota, Calif.[2]	March 22 to 25
Temple, Tex.	April 2 to 10
League City, Tex.	April 12 to 20
El Vista, Tex.	April 22 to 30
Spindle Top, Tex.	May 1 to 9
Bunkie, La.	May 11 to 21
Council Hill, Okla.	May 24 to June 1
Skiatook, Okla.	June 3 to 11
Arkansas City, Kans.	June 13 to 21
Caney, Kans.	June 23 to July 2
Mount Auburn, Ill.	July 5 to 13
Preble, Ind.	July 15 to 23
Chambersburg, Pa.	July 26 to Aug. 3

[1] Partial set of line coatings.
[2] 36 coatings on 3-inch pipe only.

UNITED STATES STANDARD GAGE FOR SHEET AND PLATE IRON AND STEEL

In an article by Henry W. Bearce, which has been submitted for publication in American Machinist, the origin and basis of the United States standard gage for sheet and plate iron and steel are discussed, with special reference to applicability of the table of approximate thicknesses to steel sheets and plates.

For the past several years it has been commercial practice to regard the original table of approximate thicknesses corresponding to the various gage numbers, contained in the act of Congress approved March 3, 1893, as applying to wrought iron only, and for commercial steel sheets and plates to use a table in which the thickness for each gage number is 2 percent less than that given in the original table. This difference in thickness corresponds to the actual difference in density of wrought iron and commercial carbon steel.

Within the past 2 or 3 years a new table of thicknesses corresponding to gage numbers, applicable to steel sheets and plates, has been proposed by certain steel companies. In this proposed table the thickness corresponding to each gage number is 4.5 percent less than the values contained in the original table. These thicknesses are arrived at by the use of a fictitious density value, apparently in order to compensate for overrun, or excess in width and length of sheets.

The permissible excess in width and length of sheets is already adequately taken care of through the application of recognized tolerances on weight, and since the United States Standard Gage is primarily a weight gage there would appear to be no good reason for introducing a new table of thicknesses to further complicate the situation.

FUEL REQUIREMENTS OF 1939 AUTOMOBILES

In 1936 the Cooperative Fuel Research Committee initiated an annual survey to determine the fuel quality requirements of modern automobiles with respect to vapor lock and knock.

The fourth annual report, prepared at the Bureau and presented by Donald B. Brooks of the Automotive Power Plants Section at the winter meeting of the Society of Automotive Engineers in Detroit on January 18, shows that the octane number of fuel required to operate 1939 automobiles without knock is slightly higher than that found for 1938 cars. Many cars, as run on the road, require a higher than normal grade of fuel to suppress knock because of improper adjustment of the spark advance mechanism. In two cases out of three, readjustment reduced the fuel requirement by about the difference between premium and regular grade gasoline. Scraping carbon made an even greater difference in 9 cases out of 10.

Half of the 1939 automobiles tested would operate satisfactorily on regular grade gasoline, but a small percentage would knock even on premium fuel. In regard to vapor lock, half of these cars would operate satisfactorily at an air temperature of 100° F on a gasoline having a Reid vapor pressure of 9 lb./in.^{2} One in eight, however, would require an 8-lb fuel, and one in twenty a 7-lb gasoline.

EFFECT OF AUTOMOBILE MILEAGE ON OCTANE-NUMBER REQUIREMENT

The octane-number requirement of a 1938 automobile was determined by Clarence S. Bruce, of the Bureau's Automotive Power Plants Section, at intervals up to a mileage of 12,500. Similar determinations were made on a 1939 car of the same make after it had been driven 10,500 miles. At 13,000 miles, carbon was scraped, and six more determinations of octane number requirement were made during the next 2,700 miles.

For each determination, the procedure involved finding the spark setting for incipient knock with each of a dozen fuels which ranged from 40 to 80 octane number. The resulting curve gave both the octane-number requirement at the manufacturer's recommended spark set-

ting, and the spark setting required for any specified octane number. All the experimental results were corrected to standard atmospheric conditions.

Car operation for 12,500 miles was found to increase the octane-number requirement by 25 units. Less than one-third was the result of carbon accumulation; change in engine condition accounted for the rest. During this operating period, the change in spark setting necessary to maintain a constant octane-number requirement of 65 was 9 crankshaft degrees.

A paper on this subject was presented at the winter meeting of the Society of Automotive Engineers in Detroit, on January 18.

THEORY OF THE POTENTIAL AND THE TECHNICAL PRACTICE OF ELECTRODEPOSITION

The literature of technical electrochemistry does not possess any treatment of electrical theory that is comparable to that in other branches of technical electricity. This lack is evident in the current literature of electrochemistry, and it has been a decided bar not only to research but also to the proper expression of observed results.

A paper by Charles Kasper, which will appear in the Transactions of the Electochemical Society, is the first of a projected series in which fundamental electrical theory will be related to the technical practice of electrodeposition. This is effected through the use of problems from theoretical electricity, of which boundary value problems are good examples, and which describe experimental situations of importance in electrodeposition. In addition, the solution of a number of new problems in electricity will be included in the exposition. In this first paper the general principles of the theory of the potential and the three most elementary cases of flow are considered.

STABILITY OF BASE-METAL THERMOCOUPLES

A paper by A. I. Dahl (RP1278) in the Journal of Research for February presents data concerning the stability of Chromel-Alumel and iron-constantan thermocouples used under certain controlled conditions. Thermocouples of various sizes from 0.025 to 0.128 inch in diameter (No. 22 to No. 8 gage) were exposed to temperatures ranging from 800° to 2,200° F, in steps of 200° F, in an atmosphere of clean air. Determinations of the changes in calibration were made after fixed periods of heating over a total heating period of 1,000 hours, or as long as the thermocouples remained serviceable. The results are presented chiefly in the form of graphs showing the changes in calibration as related to the length of time in service. Certain precautions to be followed in the use of thermocouples in order to obtain the most reliable results are discussed.

FIRST SPECTRUM OF TIN

In the Journal of Research for February (RP1275) William F. Meggers reports the remeasurement with increased precision of all the lines of the tin spectrum observable photographically from the extreme ultraviolet to the infrared, and the correction of 37 lines of still greater wavelength, observed radiometrically. The total number of lines is 378, and the longest observed wavelength is nearly 15 times the shortest. A large majority of these tin lines are classified as combinations of identified atomic-energy states, and from law-abiding series of such states the energy of binding of a valence electron in a tin atom is calculated. It is found that a free electron falling through a potential difference of 7.297 volts will acquire just enough energy to remove, upon collision with a normal tin atom, one of its valence electrons.

RADIO CRITICAL FREQUENCIES AND SOLAR ECLIPSES

Valuable information concerning the earth's upper atmosphere may be obtained by ionosphere observations during solar eclipses. Two eclipses will occur during 1940, and it is expected that ionosphere observations will be made during both of them.

It is of interest to know what critical frequencies of the ionosphere layers may be expected during the eclipses. This information will prove useful in the design of equipment, the planning of observations, the evaluation of the data, and the interpretation of the results.

Since January 1939, the Bureau has published monthly forecasts of ionosphere conditions. By the use of the same procedure, together with the available data from other parts of the world, predictions have been made of the average critical frequencies at various places for the months of the eclipses. These predictions, which will be published in the February number of the Journal of Research (RP1279 by Newbern Smith), can be used at places in the paths of the eclipse by allowing for differences in local time.

SAFETY RULES FOR RADIO INSTALLATIONS

Handbook H35, Safety Rules for Radio Installations, which was released in January, comprises part 5 (sections 50 to 59, inclusive) of the fifth edition of the National Electrical Safety Code. Certain definitions in section 1 of the code, which apply to the radio field, have also been included.

The various sections of the Handbook cover the classification of radio stations, antenna and counterpoise installation, lead-in conductors, construction at building entrance, protective devices, protective and operating grounding conductors, grounds and ground connections, connections to power supply lines, and batteries.

Copies of H35 are obtainable from the Superintendent of Documents, Government Printing Office, Washington, D. C., at 10 cents each.

ALPHA AND BETA METHYL LYXOSIDES

A comparison of the rates of hydrolysis for the aplha and beta methyl glucosides, mannosides, galactosides, and gulosides conducted by Horace S. Isbell and Harriet L. Frush shows that the configurations of all of the asymmetric carbons in the pyranose ring affect the rate of hydrolysis, and further that there is no fixed relationship between the configuration of the alpha and beta modifications and their relative rates for the hydrolysis. As reported in the February Journal of Research (RP1274), the configuration of carbon 3 appears to influence markedly the relative rates for the hydrolysis of the alpha and beta modifications. Aldopyranosides having *trans* configurations for carbons 1 and 3 are hydrolyzed more slowly than the corresponding modifications having *cis* configurations for carbons 1 and 3. This unexpectedly large influence of carbon 3, and the close resemblence of each pentose to the corresponding hexose which has the *trans* configuration for carbons 3 and 5, suggest that the configuration of carbon 3 plays an important role in determining the special arrangement of the whole molecule. The similarity of the methyl gulosides and α-glucoheptosides, on the one hand, and the methyl lyxosides, mannosides, and α-galaheptosides, on the other hand, furnishes a substantial basis for the allocations of lyxose to the mannose series.

REACTION OF BROMINE WITH FURFURAL AND RELATED COMPOUNDS

A rapid and accurate volumetric method of determining furfural, based upon its reaction with bromine in aqueous solution at 0° C, was developed some time ago at the Bureau. Work on the quantitative conversion of pentoses and methylpentoses to furfural and methylfurfural has also been recently published. During these studies, the course of the reaction of bromine with furfural, under specified conditions, was of interest. The results of some of these experiments are given in RP1276 by Elizabeth E. Hughes and S. F. Acree in the February Journal of Research. Quantitative data on the bromine consumed during the reaction and the acid formed were obtained. The product of the reaction of molar proportions of bromine and furfural was precipitated with phenylhydrazine and analyzed. The phenylhydrazone contains no bromine. Its composition and the analytical data indicate that when molar proportions of bromine and furfural react, the bromine is changed to bromide ions, 2 equivalents of hydrogen ions are formed from the water, and 2 equivalents of hydroxyl ions or oxygen combine with the furfural.

STRUCTURE OF DIFRUCTOSE ANHYDRIDE III

Inulin, the polysaccharide which occurs abundantly in dahlia tubers and other composite flowering plants, can be resolved into the simple sugars by treatment with dilute acids. The mixture of sugars thus formed consists mainly of levulose or fructose, but contains about 5 percent of a group of three difructose anhydrides. In each instance, these are composed of two molecules of fructose joined by two oxygen "bridges." The problem which presents itself is to determine which carbon atoms of the fructose molecules are attached to the bridges. To determine these structures, various substituting groups, particularly methyl groups, are introduced into the sugars. These substituents will necessarily fall on the carbon atoms which are not already involved in the connections between the fructose molecules. The complex sugar is then separated into its two simple fructose molecules, each bearing the substituents which have been introduced. By identifying these simple substituted fructose molecules,

it is possible to determine by elimination where the connecting links were situated.

If the carbon atoms of one fructose molecule are numbered from 1 to 6 and the other 1′ to 6′, difructose anhydride I is found to have oxygen bridges connecting carbon atom 1 with 2′ and 1′ with 2. Difructose anhydride III, which is the subject of a study by Emma J. McDonald and Richard F. Jackson reported in the February Journal of Research (RP1277), has bridges connecting carbon atom 1 with 2′ and 2 with 3′.

NEW AND REVISED PUBLICATIONS ISSUED DURING JANUARY 1940

Journal of Research [2]

Journal of Research of the National Bureau of Standards, volume 24, number 1, January 1940 (RP1266 to RP1272, inclusive). Price 30 cents. Annual subscription, 12 issues, $3.50.

Research Papers [2]

[Reprints from the November 1939 Journal of Research]

RP1252. A portable apparatus for determining the relative wear resistance of concrete floors. Louis Schuman and John Tucker, Jr. Price 10 cents.

RP1253. Application of the interferometer to the Measurement of dimensional changes in rubber. Lawrence A. Wood, Norman Bekkedahl, and Chauncey G. Peters. Price 5 cents.

RP1255. Photochemical decomposition of the cystine in wool. Henry A. Rutherford and Milton Harris. Price 5 cents.

RP1256. Tensile properties of rubber compounds at high rates of stretch. Frank L. Roth and William L. Holt. Price 5 cents.

RP1257. Internal absorption of gamma rays in radium-beryllium neutron sources. Leon F. Curtiss. Price 5 cents.

RP1258. Determination of cross-sectional areas of structural members. James A. Miller. Price 10 cents.

Handbooks [2]

H35. Safety rules for radio installations. (Comprising Part 5 of the fifth edition of the National Electrical Safety Code). (Supersedes H9.) Price 10 cents.

Commercial Standards [2]

CS76. Hardwood interior trim and molding. Price 5 cents.

Building Materials and Structures [2]

[Persons who wish to be notified of new publications in the Building Materials and Structures series as soon as they are available, should write to the Superintendent of Documents, Government Printing Office, Washington, D. C., asking that their names be placed on the special mailing list maintained by him for this purpose.]

During the past month the following publications in this series have been issued:

BMS31. Structural properties of "Insulite" wall and "Insulite" partition constructions sponsored by The Insulite Company. Herbert L. Whittemore and Ambrose H. Stang with the collaboration of Thomas R. C. Wilson, Forest Products Laboratory. Price 15 cents.

BMS35. Stability of sheathing papers as determined by accelerated aging. Samuel G. Weissberg, Daniel A. Jessup, and Charles G. Weber. Price 10 cents.

Technical News Bulletin [2]

Technical News Bulletin 273, January 1940. Price 5 cents. Annual subscription, 50 cents.

MIMEOGRAPHED MATERIAL

Letter Circulars

[Letter Circulars are prepared to answer specific inquiries addressed to the National Bureau of Standards and are sent only on request to persons having definite need for the information. The Bureau cannot undertake to supply lists or complete sets of Letter Circulars or send copies automatically as issued.]

LC579. List of Commercial Standards. (Revised to January 1, 1940.) (Supersedes LC568.)

LC580. Railway track scale testing service of the National Bureau of Standards, fiscal year 1939 (July 1, 1938 to June 30, 1939).

LC581. Color of illuminant and efficiency of the worker. (Supersede LC352.)

---

[2] Send orders for publications under this heading only to the Superintendent of Documents, Government Printing Office, Washington, D. C. Subscription to Technical News Bulletin, 50 cents per year; Journal of Research, $3.50 per year (United States and its possessions, and Canada, Colombia, Cuba, Dominican Republic, Ecuador, Guatemala, Honduras, Mexico, Newfoundland (including Labrador), Panama, and Venezuela); other countries, 70 cents and $4.50, respectively.

LC582. List of Simplified Practice Recommendations. (Revised to January 1, 1940.) (Supersedes LC561.)

RECENT BUREAU ARTICLES APPEARING IN OUTSIDE PUBLICATIONS [3]

The role of the ionosphere in radio wave propagation. J. H. Dellinger. Trans. Am. Inst. Elec. Engineers (33 West 39th St., New York, N. Y.) **58,** 803 (1939).

Observations on the behavior of steel corroding under cathodic control in soils. I. A. Denison and R. B. Darnielle. Trans. Electrochem. Soc. (Columbia University, New York, N. Y.) **76,** 199 (1939).

Film-forming plastics: Effect of solvents, diluents, and plasticizers. Frank W. Reinhart and Gordon M. Kline. Ind. Eng. Chem. (Mills Building, Washington, D. C.) **31,** 1522 (December 1939).

The elastic properties of cast iron. A. I. Krynitsky and C. M. Saeger. Foundry Trade J. (49 Wellington St., Strand, London, W. C. 2, England) **61,** 373 and 393 (November 30 and December 7, 1939).

Watertightness and transverse strength of masonry walls. Douglas E. Parsons. Reprint of address delivered at annual meeting of Structural Clay Products Institute (1427 Eye St., N. W., Washington, D. C.) (October 5, 1939).

[3] These publications are not obtainable from the Government. Requests should be sent direct to the publishers.

U. S. GOVERNMENT PRINTING OFFICE: 1940